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ADHERENCE TO HIGHLY ACTIVE ANTIRETROVIRAL THERAPY AMONG PATIENTS IN THE KEETMANSHOOP ANTIRETROVIRAL THERAPY PROGRAMME, NAMIBIA

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KEYWORDS

Adherence

AIDS

Barriers

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HIV

Outcomes

ABSTRACT

The government of Namibia established a comprehensive HIV/AIDS treatment and care programme in 2002. This programme provides anti-retroviral treatment to all eligible HIV patients in the public health sector. The antiretroviral treatment programme in Keetmanshoop started in October 2003. Adherence to treatment regimes in HIV care is a key factor in determining clinical outcomes and is associated with improved survival among HIV and AIDS patients. Sustained high levels of adherence (95% or more) are essential for the success of highly active antiretroviral therapy (HAART). Maintaining high adherence levels is therefore a major concern in HIV/AIDS treatment programmes. This study investigated adherence to HAART among patients in the Keetmanshoop antiretroviral therapy (ART) clinic and the factors that affect adherence.

Aim of the research

The aim of the research was to describe adherence to HAART and factors influencing adherence among patients in Keetmanshoop ART clinic, Namibia.

Objectives

1. To describe levels of adherence to HAART amongst clients at Keetmanshoop ART clinic.
2. To assess the changes in CD4 count and body weight of clients on HAART over a 12 month period.
3. To assess factors associated with adherence to HAART.
4. To analyse associations between CD4 count and adherence.
5. To analyse associations between changes in body weight and adherence.

Methodology

A quantitative descriptive cross-sectional survey was used. The study population included all clients 18 years and above, who were on HAART for one year or more at the Keetmanshoop clinic. One hundred and six clients participated in the study. Data was collected through an interview with the participants and a review of clinical records.

Results

Most respondents had good adherence levels; with 86.1% reporting optimal adherence levels. The respondents also showed an increase of median CD4 counts from 126 cells/µl at baseline to 304 cells/µl at 12 months and an increase in body weight from an average of 50kg at baseline to an average of 57kg at 12 months. Adherence levels were found to have an impact on CD4 cell counts and on body weight, with respondents who had sub-optimal adherence experiencing a drop in median CD4 cell counts and median body weight by 12 months. Living far from the clinic (>10km) was found to be the only factor significantly associated with sub-optimal adherence.

Conclusion

The study showed a positive correlation between adherence levels and CD4 cell counts and body weight gain. In the absence of viral load, CD4 cell count testing can be used as a measure of adherence. Though most respondents appear to be adhering well to HAART, a sub-optimal adherence rate of >10% is a concern for the Keetmanshoop ART programme and will need to be addressed. There is a need for further research to determine the level of default or attrition from HAART in the programme.

DECLARATION

I declare that **"Adherence to Highly Active Antiretroviral Therapy among Patients in the Keetmanshoop Antiretroviral Therapy Programme, Namibia"** is my own work, that it has not been submitted for any degree or examination in any other university, and that all the sources I have used or quoted have been indicated and acknowledged by complete references.

Wambui Njuguna

Signed: ……

Date: March 2010

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ACRONYMS

AIDS……Acquired Immune Deficiency Syndrome

ANC…….Antenatal Care

ART……..Anti-retroviral Therapy

C.I…….Confidence Interval

DCC……..District Coordinating Committee

DOT……..Directly Observed Therapy

HAART…….Highly Active Antiretroviral Therapy

HIV……Human Immunodeficiency Virus

IQR……Interquartile Range

KAPB……Knowledge, Attitudes, Practice and Behaviour

MEMS……..Medication Events Monitoring System

MOHSS……Ministry of Heath and Social Services

MTC…….Mobile Telecommunications Limited

NDHS……Namibia Demographic and Health Survey

NGO……..Non-Governmental Organisation

PEPFAR……The President's Emergency Plan for Aids Relief

PMTCT…….Prevention of Mother-To-Child Transmission of HIV

VCT……..Voluntary Counselling and Testing

WHO…….World Health Organisation

CHAPTER 1
INTRODUCTION

1.1 GLOBAL HIV/AIDS EPIDEMIC

1.1.1 GLOBAL STATUS OF THE HIV EPIDEMIC

Acquired immunodeficiency syndrome (AIDS) was first recognised in 1981 and the Human immunodeficiency virus (HIV) identified and confirmed as a necessary and sufficient cause of AIDS in 1983 (Hoffman, Rockstroh & Kamps, 2005). Since then the HIV epidemic has increased exponentially and spread widely to become a global pandemic. UNAIDS reported that there were 32.9 million people living with HIV/AIDS worldwide, 2.2 million new HIV infections and 2 million HIV-related deaths in 2007 (UNAIDS, 2008). Sub-Saharan Africa, with only a tenth of the world's population, had the highest burden of HIV/AIDS. This region accounted for 67% of all people living with HIV/AIDS, 60% of all new HIV infections and 75% of all HIV-related deaths worldwide (UNAIDS, 2008).

1.1.2 HEALTH AND SOCIAL IMPACT OF HIV

HIV/AIDS has not only been a health issue but has had substantial social, economic and developmental impacts (Dixon, McDonald & Roberts, 2002). The epidemic has mainly affected people during their most productive years, in early and mid-adulthood. Impact on macro-economy has included loss of skilled workers, reduced productivity due to ill health and increased training cost for new workers when skilled workers die (Dixon *et al*, 2002; Economic commission for Africa, Undated). Early HIV/AIDS-associated mortality has led to a drop of life expectancy to less than 50 years in most countries in sub-Saharan Africa. Life expectancy in Zimbabwe, for example, has dropped from 69 years to 40 years (Economic Commission for Africa, Undated). In Namibia the life expectancy had dropped from 59 and 63 years for men and women respectively in 1991 to 48 and 50 years in 2001 (Ministry of

Health and Social Services [MOHSS], 2008a). HIV/AIDS has also been postulated to be a national security threat as it takes a toll on the police and armed forces, affecting maintenance of law, order and security (Feldbaum, Lee & Patel, 2006).

At the family level, poverty increases when the breadwinner succumbs to HIV and AIDS, leading to reduced household income and scarce financial resources being used to pay for medical care (Global Action for Children, 2009). As parents die of AIDS, children are orphaned and are left under care of elderly grandparents, other over-burdened relatives or fending for themselves (Economic Commission for Africa, Undated). UNAIDS estimated that there were close to 12 million children orphaned as a result of HIV and AIDS in sub-Saharan Africa in 2007 (UNAIDS, 2008). In southern African countries, at least half of the children orphaned nationally are as a result of HIV/AIDS (Pennington, Kanabus & Pembrey, 2009).

Children affected or orphaned by HIV/AIDS may suffer socially, psychologically and economically. They are at risk of separation from siblings and familiar environments, exploitation by care-givers or other adults, loss of their rightful inheritance, stigma and discrimination and lack of educational opportunities (Global Action for Children, 2009). Without social and economic support, these orphaned children may not develop their full potential or the appropriate social and life skills needed for a productive adult life (UNAIDS, 2009; Global Action for Children, 2009). This could have long-term effects and translate into low productivity a generation later (Economic Commission for Africa, Undated).

1.1.3 IMPACT OF ANTIRETROVIRAL TREATMENT

Treatment with highly active antiretroviral therapy (HAART) significantly reduces the HI-virus in a person and slows down the progression of HIV disease to AIDS (Hoffman *et al*, 2005). HAART has transformed HIV/AIDS from a fatal disease to a manageable chronic disease and given hope to millions of people living with HIV/AIDS (O'Reilly, 2005; UNAIDS, 2008). HAART has been found to reduce HIV/AIDS-related mortality, morbidity and hospitalisations. A study on mortality in sub-Saharan Africa found that the excess mortality of persons with HIV/AIDS is reduced by HAART and mortality approaches that of the general population in the second year on treatment (Brinkof, Boulle, Weigel, Messou, Mathers, Orrell *et al*, 2009).

By reducing HIV-related morbidity, HAART lessens the social and economic impact of the HIV epidemic, by improving productivity and reducing expenditure on treatment of opportunistic infections and hospitalisations. This is exemplified by a study in a private company in Abidjan in the period 1998 to 2000 (Ehoile, Bissagnene, Gaumon, Mambo, Guiza, Kakou & Kadio, 2002). This study found that workplace HIV strategies which included prevention activities, voluntary counselling and testing (VCT), provision of care and antiretroviral treatment, were associated with a three-fold reduction in the cost of caring for HIV-positive employees and a ten-fold decrease in absenteeism.

HAART has been shown to have an impact on the prevention of new HIV infections (Montaner, Hogg, Wood, Kerr, Tyndall, Levy & Harrigan, 2006). By suppressing viral replication, HAART reduces HIV-1-RNA concentrations in plasma, semen, vaginal secretions and breast milk. Studies in HIV sero-discordant couples and in mother-to-child transmission settings have shown that the risk of HIV transmission is dramatically reduced

when HIV-1-RNA levels are <1000 copies/ml (Montaner *et al*). Availability of HAART also had positive influences on VCT uptake, with more people willing to test for HIV now that treatment is available. In Haiti, use of VCT increased by 300% within 2 years of starting an antiretroviral treatment programme (Koenig, Leandre, & Farmer, 2004). Most people tested negative and this provided health workers opportunities for promoting preventive behaviours.

1.1.4 ACCESS TO ANTIRETROVIRAL THERAPY

Antiretroviral therapy was previously very expensive and out of reach for millions of people living with HIV/AIDS in the developing countries. There have been intense international efforts to make the treatment affordable and available to as many people as need it, especially in the developing countries (Cameron & Gupta, 2002). As a result of these efforts, there were 2.99 million people on HAART in medium and low income countries by the end of 2007 (Brinkof *et al*, 2009). This represented 31% of the estimated 9.6 million people in need of treatment in these countries. In sub-Saharan Africa the people on HAART increased from 1.38 million in 2006 to 2.12 million in 2007 (Brinkof *et al*, 2009). With improved access to HIV treatment, the focus has shifted to maintaining optimal adherence to HAART and retaining patients in treatment programmes in the long-term.

1.1.5 ADHERENCE TO ANTIRETROVIRAL THERAPY

Adherence can be defined as the extent to which patients take their medication as prescribed (Osterberg & Blaschke, 2005). Adherence is an ongoing challenge in the management of many chronic diseases. The consequences of poor adherence are poor health outcomes and an increase in the disease burden as well as increased health care costs (WHO, 2001). Poor adherence has been found to be the most important reason why HAART regimens fail (Boyle, 2000). Maintaining very high levels of adherence (taking more than 95% of the

prescribed antiretroviral medication) is essential to suppress HIV replication (Gill, Hamer, Simon, Thea & Sabin, 2005). Suppression of viral replication is associated with improved biological and clinical outcomes. Adherence levels that are below 95% (sub-optimal) have been found to lead to rebound viral replication with the possibility of the emergence of resistant HIV variants. This could cause treatment failure and progression of disease to AIDS (Bangsberg, Perry, Charlebois, Clark, Robertson, Zolopa *et al*, 2001; McNicholl, 2008).

1.1.6 HEALTH AND SOCIOECONOMIC CONSEQUENCES OF POOR ADHERENCE TO HAART

Poor adherence to HAART could have serious consequences for both the individual and the wider community. At the community level, there is a risk of an increased prevalence of resistant HIV strains and transmission of the resistant HIV strains in the general population, especially in primary infections (Poppa, Davidson, Deutsch, Godfrey, Fisher, Head *et al*, 2003). At individual level, poor adherence could result in viral resistance and treatment failure which could lead to progression of disease with re-emergence of opportunistic infections (Poppa *et al,* 2003). Treatment failure would necessitate use of 2nd line regimens which are more complex, more expensive and associated with more toxicities. Treating opportunistic infections and the use of 2nd line regimens increases health care costs and reverses the earlier economic benefits of HAART. Poor adherence has also been shown to increase the risk of mortality, especially at very low CD4 cell counts (Abaasa, Todd, Ekoru, Kalyango, Levin, Odeke *et al*, 2008).

It is therefore imperative that HIV treatment programmes aim for sustained high levels of adherence to HAART to prevent development of drug-resistant HIV strains. Knowing

adherence behaviour and factors that influence adherence would help treatment programmes develop strategies that assist persons on treatment maintain optimum adherence levels.

1.2 STUDY SETTING

1.2.1 COUNTRY BACKGROUND – NAMIBIA

Namibia has a high burden of HIV/AIDS. The national HIV prevalence in the general population in Namibia is estimated at 19.6% (The President's Emergency Plan for AIDS Relief [PEPFAR], 2008). According to the 2001 census, Namibia has a population of 1,830,330 million people (MOHSS, 2008a). It is sparsely populated with a population density of 2.1 /km^2. Forty-three percent (43%) of the population is under 15 years; and 33% live in urban areas.

The first identified case of HIV/AIDS in Namibia was in 1986 (MOHSS, 2008b). Since then HIV/AIDS has grown to reach epidemic levels in the general population. The first HIV antenatal surveillance in 1992 showed a HIV prevalence of 4.2% among pregnant women attending antenatal care (ANC). This prevalence increased and peaked in 2002 at 22% and has been dropping since. In 2008, the national HIV prevalence among pregnant women attending ANC was 17.8 % (MOHSS, 2008b). UNAIDS estimates that there were 200,000 people living with HIV/AIDS in Namibia in 2007 (UNAIDS, 2008). AIDS accounts for 50% of deaths among persons aged 15-49 year while 75% of all hospitalizations in public hospitals are HIV-related (UNAIDS , 2008).

The government of Namibia has made the fight against HIV/AIDS a top priority. In 2003 the government introduced antiretroviral treatment as a component of Comprehensive HIV/AIDS Care. This programme provides anti-retroviral treatment to all eligible HIV positive patients,

at no cost to the patient, in the public health sector (MOHSS, 2007). The programme started at six pilot hospitals and had expanded to all 34 hospitals in the country by year 2006. By end of 2006, 30% of all patients in need of treatment for HIV had started receiving HAART (MOHSS, 2007). Sixteen percent of the patients on HAART are children. Women accounted for 64% of all adult patients on HAART nationwide in the public sector (MOHSS, 2007).

Monitoring of patients is done through 6-monthly CD4 cell count checks. In 2007 the Ministry introduced viral load testing as a monitoring tool and is done at 6 months after starting HAART. In a review of viral load results, 66% of the patients on HAART in the public sector were found to have viral loads in the range of 40-1000 copies/ml (MOHSS, 2009). The Technical Advisory Committee has recommended that patients who have viral loads <1000 copies/ml should be considered to be adequately suppressed (MOHSS, 2009).

1.2.2 DISTRICT BACKGROUND – KEETMANSHOOP

Keetmanshoop district is in the southern region of Namibia. Keetmanshoop district is sparsely populated with a total population of 36,427 and a population density of 0.69 per km^2 (Keetmanshoop District Coordinating Committee [DCC], 2008). Keetmanshoop district is served by one hospital, two health centres and five clinics. There is also an outreach mobile unit that provides health services to areas that are far from the clinics. Transport is a challenge in the district due to the vastness of the district and lack of public transport. Only a small percentage of the population have access to private vehicles. Most people use donkey carts for transportation. This affects access to health services and has been a challenge in the ART programme in reaching those HIV positive citizens in need of HAART who live far from the health services (Keetmanshoop DCC, 2008).

HIV is one of the major public health challenges in the district (Keetmanshoop DCC, 2008). The 2008 Antenatal HIV surveillance showed a HIV prevalence of 12.7% among antenatal attendees in the district (MOHSS, 2008b). The ART programme in Keetmanshoop district started in October 2003. By the end of 2007, 1622 adults and 103 children were registered for chronic HIV care on the programme. Of these, 675 adults and 73 children receive HAART (Keetmanshoop DCC, 2008). Adherence to HAART is the cornerstone of successful ART programme. Clients on HAART are encouraged and supported to adhere to treatment at every opportunity. The Keetmanshoop programme has community counsellors involved in counselling clients on positive living and adherence to treatment. All health workers are also encouraged to emphasise adherence and commitment to treatment with every contact with the client. Despite these efforts, the ART defaulter rate by end of 2007 was about 5.9% (Keetmanshoop DCC, 2008).

1.3 PROBLEM STATEMENT

Since the initiation of the Keetmanshoop ART programme, no formal study has been conducted to assess clients' adherence to HAART. In the monthly Keetmanshoop ART committee meetings, it is reported that most clients on treatment are satisfied with the care received, and are highly motivated to adhere to treatment. However, it is essential to research and describe adherence behaviour of patients and the factors that affect this behaviour as this information could be used to improve adherence counselling and develop strategies to maintain high adherence levels.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

The current study will research adherence behaviour in Keetmanshoop ART clinic and factors associated with adherence and compare the findings with studies done in other settings in Africa. This chapter reviews the literature available on adherence measures, factors influencing adherence and findings from other studies done in Africa.

2.2 MEASURING ADHERENCE

Measuring adherence to medication accurately is complicated, even in well-resourced countries. The ideal measurements would be directly observing a patient take the medicines (directly observed therapy – DOT) or methods that measure the drug levels or its metabolite in the blood (Osterberg & Blaschke, 2005). Measuring a biological marker in the blood and electronic drug monitoring through medication events monitoring systems (MEMS) are indirect measures that are precise. These methods are expensive and out of reach for most public health systems in sub-Saharan Africa. Adherence can also be measured by asking patients about their pill-taking habits (Osterberg & Blaschke, 2005). Adherence estimates by self-report are usually high as patients tend to over-report adherence. A drawback with self-reporting is that it depends on patient's belief and interpretation of adherence (Hill, Kendall & Fernandez, 2003). A patient may modify their regime or change the timing of doses for his/her own convenience and still consider himself/herself adherent. A patient may also take breaks from therapy but be adherent the other times and consider himself/herself adherent.

Pill counts, pharmacy refill records and keeping of appointments are other objective methods that can be used as indirect measures of adherence (Osterberg & Blaschke, 2005; Coates, 2003). In a study in Mozambique, adherence to appointments was used as a measure of treatment adherence (Marazzi, Bartolo, Gialloreti, Germano, Guidotti, Liotta *et al,* 2006). In a study in South Africa where researchers were comparing the accuracy of adherence-based monitoring and CD4 cell monitoring to detect current or predict future virologic failure, pharmacy refill data was used to measure adherence (Bisson, Gross, Bellamy, Chittams, Hislop, Regensberg *et al*, 2008). The limitation of pill counts is that patients may manipulate pill counts by dumping some pills so as to have the correct number. Measuring adherence by pharmacy refill records and keeping of appointments presupposes that patients will actually take the medications they collect from the pharmacy appropriately.

Adherence can also be measured by determining the physiological or clinical response to therapy. Patients on HAART have experienced improvements in quality of life and fewer opportunistic infections (Stone, 2002). Patients also report improved appetites (Nakiyemba, Aurugai, Kwasa & Oyabba, 2004). In a study by Verweel (2002) and others, HAART had a positive influence in growth in children. (Verweel, Rossum, Hartwig, Wolfs, Scherpbier & De Groot, 2002). The body mass index increased in children who had a reduction of viral load of at least 1.5 log. This increase was more in children with advanced disease and malnutrition (Verweel et al, 2002). Another study investigated the cumulative probability of a weight gain equal or greater than 10% in patients starting HAART (Teshale, Hanson, Sulivan & Wolfe, 2004). Weight gain was highest in patients starting therapy with CD4 cell counts < 200 and/or BMI < 20. The cumulative probability of a weight gain >/= 10% in these patients was 0.15. However the weight gain was found not to correlate with changes in viral load or CD4 counts and was therefore not useful as a surrogate marker (Teshale et al, 2004).

Virological response is determined by measuring the viral loads while immunological response is determined by measuring the CD4 cell counts (Hoffman *et al*, 2005). The measure of treatment success is the ability of HAART to suppress viral replication. This is done through monitoring of viral load. Viral load is very sensitive to adherence levels and suppression to undetectable levels is dependent on very high levels of adherence. Failure to suppress viral load or a viral rebound to detectable levels in a patient who previously had viral suppression is usually due to moderate or low adherence levels (Bisson *et al,* 2008). Measurement of adherence by other methods can be correlated by viral load testing. However in the presence of resistance, viral loads may remain high despite optimal levels of adherence.

In absence of viral load testing, the WHO recommends using CD4 cell counts in monitoring patients on HAART in resource-limited settings. However CD4 cell levels start declining after virologic failure (Bisson *et al*, 2008). CD4 cell counts can also be affected by inter-current diseases. In the study by Bisson and others (2008), the researchers found that at 6 and 12 months, pharmacy refill adherence levels predicted virologic failure more accurately than CD4 cell count changes. Adherence levels during the first 3 months were also able to predict virologic failure at 6 months. The researchers suggest that monitoring adherence levels may provide an accurate early warning of virologic failure. It could help identify patients at risk of virologic failure. This provides an opportunity to intensify adherence support thus averting treatment failure and the cost of changing to 2nd line regimens.

2.3 FACTORS AFFECTING ADHERENCE

Social and psychological assessment of patients before start of HAART can help identify factors that may cause problems with adherence (Duran, 2004). This assessment could allow

the clinicians to prioritize support for patients who may seem to have higher levels of social risk for poor adherence. However, the ability of clinicians to predict which patients are likely to adhere to taking medication has been shown to be limited. In a study reported by Stone (2002) clinicians' predictions about which patients were likely to have adherence >80% were incorrect for 41% of their patients. In a Botswana study clinicians had a 68% likelihood of correctly estimating their patients' adherence levels (Weiser, Wolfe, Bangsberg, Thior, Gilbert, Makhena *et al,* 2003). Adherence is not necessarily static but may change in a particular patient over times due to different circumstances (Stone, 2002). A patient's ability to adhere to treatment and to maintain optimal adherence is influenced by various factors that affect his/her life. These factors may be patient-related, medication-related, or health system-related.

Patient-related factors

A patient's adherence behaviour may be affected by social, economic and psychological factors (Kagee, 2004). Forgetfulness, being too busy, a change in daily routine, and travelling without medication have been cited as frequent reasons why patients did not adhere to treatment (Murphy, Roberts, Martin, Marelich & Hoffman, 2000; Weiser *et al,* 2003; Mills Nachega, Bangsberg, Singh, Rachlis, Wu *et al,* 2006). Fear of disclosure, alcohol and drug abuse, stress, worries in everyday life, depression, feeling angry or hopeless and not wanting to be seen taking HAART in public were other reasons cited for poor adherence (Murphy *et al,* 2000; Mills *et al,* 2006). Some patients may stop their treatment for periods of time when they feel healthy (Murphy *et al,* 2000).

In studies in well-resourced countries only depression, active alcohol abuse, active injection drug use and low literacy have been found to consistently predict poor adherence (Stone,

2002). Socio-economic status, age, sex or educational level have not been found to be significantly associated with adherence to HAART (Nachega, Stein, Lehman, Hlatshwayo, Mothopeng, Chaisson & Karstaedt, 2005; Coetzee, Boulle, Hildebrand, Asselman, Cutsem & Goemaere, 2004; Stone, 2002; Weiser *et al*, 2003). Nachega and others (2005) found that fear of stigma from the partner was among the main risk factors for poor adherence to HAART in Soweto, South Africa.

A patient's commitment to medication is also influenced by their belief about the illness, acceptance of illness and their belief about the effectiveness of the treatment (Kagee, 2004). Improvement in health status increases confidence in the medication and motivates a patient to continue adhering (Watt, Maman, Earp, Eng, Setel, Golin *et al*, 2008). A patient's self-confidence and self-worth and his/her belief of where the responsibility for recovery lies will also affect how adherent they are to therapy (Kagee, 2004). When a patient is more knowledgeable about the illness and the treatment they are more likely to adhere.

Knowledge about HIV has been found to be high in Africa. In a South African KAPB study, 89% of persons knew that HIV causes AIDS and 65% of persons knew that missing HAART doses could lead to disease progression (Nachega *et al*, 2005). In the 2006-2007 Namibia Demographic and Health Survey (NDHS) comprehensive knowledge about HIV causes and transmission among young people aged 15-24 years was 65% for women and 62% for men (MOHSS, 2008a). In a study in Botswana 98% and 96% of participants knew the modes of transmission of HIV and the modes of prevention of transmission respectively (Weiser *et al*, 2003). Interventions that increase clients' knowledge and insight into the illness and treatment facilitate adherence. In an experimental study in France, an educational intervention was found to have an impact on adherence levels in a group that received an

educational intervention (Goujard, Bernard, Sohier, Peyramond, Lancon, Chwalow *et al*, 2003). Mean adherence scores in this group was +0.25 and +0.22 while that of a control group was -0.19 and -0.05 at 6 and 12 months respectively. After the control group underwent the educational intervention, the mean adherence scores were similar in both groups at 18 months (Goujard *et al*, 2003).

Social support has also been found to be a predictor of good treatment adherence (Kagee, 2004). Encouragement from family, friends and health workers influences a patient positively. An ethnographic study conducted in three African countries to explore better adherence levels found in Africa has concluded that social support and responsibilities played a major part in ensuring patients' adherence to HAART (Ware, Idoko, Kaaya, Biraro, Wyatt, Agbaji *et al*, 2009). Patients were helped by family members, treatment partners and sometimes health workers both socially and financially. These helpers expected good adherence and made their expectations known. This created a responsibility to the patient to adhere to treatment so that their health would improve. With improved health, the burden of caring for the patient is reduced and he/she is able to meet his/her social and family obligations (Ware *et al*, 2009).

Family support and support from neighbours and other community members were also found to be major contributors to good adherence in Uganda (Nakiyemba *et al*, 2004). In Tanzania patients received material and emotional support from friends and family which helped with adherence (Watt *et al*, 2008). This study found that the need for patients to stay healthy to meet family obligations was an important motivator for adherence. The patients also developed strategies that linked pill-taking to their daily routines thus enhancing adherence. This was also seen in a study in Belgium where care-givers to paediatric patients on HAART

develop their own daily strategies to ensure their children adhere to HAART (Hammami, Nostlinger, Hoeree, Lefevre, Jonckheer & Kolsteren, 2004).

Medication-related factors

High pill burdens, frequency of dosing and dietary restrictions are some of the factors that may contribute to poor adherence (Osterberg & Blaschke, 2005). Unpalatable medicines, side effects and complex regimens also contributed to poor adherence. Adherence has been shown to improve as frequency of dosing is reduced (Osterberg & Blaschke, 2005). In the well-resourced countries, the experience of side-effects to the medication has been a significant predictor of adherence. However, due to the unique nature of HIV and the lifeline antiretroviral therapy has provided for HIV-positive patients in Africa, medication-related factors have not adversely affected adherence. It has been suggested in literature that people in Africa have higher motivation for adherence to HAART and are more accepting of side effects because "they see and experience the disastrous effects of untreated HIV/AIDS everywhere in their daily lives" (Nachega *et al*, 2005; Weiser *et al*, 2003).

In a South African study, medication-related food restrictions and taking 10 or more tablets per day were not significantly associated with adherence (Orrell, Bangsberg, Badri & Wood, 2003). One HAART client in a Ugandan ART programme, while commenting on the high pill burden per day, said "I would be prepared to take 100 pills every day if that was what was needed, because I know what the alternative is" (UNAIDS, 2003). In Soweto, South Africa, Botswana and Mozambique, though patients experienced side effects, only a small percentage said this affected their adherence. This was also seen in Uganda where patients took their treatment despite the side-effects (Nakiyemba *et al*, 2004). There have been significant improvements in antiretroviral medications, with pills that can be taken twice or

once daily and co-formulations incorporating 2 or 3 types of medicine in a single pill (Stone, 2002). These innovations reduce dosing frequency and the number of tablets per dose. Currently most antiretroviral regimens are taken twice daily with 1 to 3 tablets per dose.

Health system-related factors

A poor relationship with the health care provider and dissatisfaction with the provider can lead to poor adherence. Trust in the health care provider and satisfaction with the service promotes confidence and compliance of instructions of the health workers (Osterberg & Blaschke, 2005); Watt *et al*, 2008). Other health systems related barriers to adherence include cost, distance to facility and availability of medication. In studies in Malawi and Botswana where treatment was sourced privately, financial constraints were a major factor in gaps in adherence (Van Oosterhout, Bodasing, Kumwenda, Nyirenda, Mallewa, Cleary *et al,* 2005; Weiser *et al,* 2003). In Cote D'Ivoire, the main barriers to adherence identified were cost of treatment and stock-outs of medication in the pharmacy (Ehoile *et al*, 2007). The Malawi study also reported stock-outs as a barrier to adherence. Cost as a factor affecting adherence was also seen in the Senegalese programme where adherence improved in the second year after the amount to be paid by the client reduced (Laniece, Ciss, Desclaux, Diop, Mbodj, Ndiaye *et al,* 2003). In a Ugandan study patients related their difficulties in raising money for transport to the clinics and sometimes walking to clinics when there were no funds (Nakiyemba *et al*, 2004).

2.4 ADHERENCE IN AFRICAN STUDIES

Findings from pilot programmes and research-based anti-retroviral programmes showed high levels of adherence to HAART in Africa. The clients had a lot of support from the programmes. In a Senegalese pilot programme, 88% of clients had good adherence levels

(Laurent, DiaKhate, Gueye, Toure, Sow, Faye *et al,* 2002). At an adult HIV clinic in Soweto, South Africa, a survey found 88% of clients having 95% adherence in the previous one month (Nachega *et al,* 2004). In another South African study, the median adherence level was 93.5%. Of those who had 95% or more adherence, 73.4% had viral loads of <400 at 48 weeks on treatment (Orrell *et al*, 2003). These high levels of adherence have persisted as access to antiretroviral therapy increased. In two health facilities in Gauteng, South Africa, Kigozi (2008) found 88.8% of clients having adherence levels of 95% and above. In a meta-analysis of studies in Africa and North America, the African studies showed favourable adherence levels with a pooled adherence for African studies of 77% compared to the American studies' level of 55% (Mills, Nachega, Buchan, Orbinski, Attaran, Singh *et al,* 2006).

However, there is a fear that as antiretroviral therapy programmes expand, there could be increased problems with adherence and loss to follow up. This was observed in a study in Abidjan, Cote D'Ivoire where treatment was offered on a large scale in three public clinics. In this study, adherence in three urban clinics was found to be sub-optimal (<90%) in 76% of the patients (Eholie, Tanon, Polneau, Ouiminga, Djadji, Kangah-Koffi *et al,* 2007). Another problem is attrition of patients in the antiretroviral treatment programmes. In a meta-analysis of studies from 13 African countries, mean retention rates of patients in treatment programmes was found to be 79.1%, 75% and 61.6% at 6, 12 and 24 months, respectively (Rosen, Fox & Gill, 2007). The main cause of attrition was loss to follow up, accounting for 56% of the attrition. Death accounted for 40% of attrition.

2.5 CONCLUSION

In the review of literature, it has emerged that the best measure of adherence to HAART is monitoring the viral load. CD4 cell count monitoring has been used as a surrogate measure of

adherence in settings where viral load was not done. Weight gain has not been found to correlate well with adherence. Studies in Africa have shown high levels of adherence to HAART but as programmes scale-up there could be a risk of lower adherence levels.

CHAPTER 3

AIMS AND OBJECTIVES

3.1 AIM OF THE STUDY

The aim of the study was to describe adherence to HAART and factors influencing adherence among patients in Keetmanshoop district.

3.2 OBJECTIVES

1. To describe levels of adherence to HAART amongst clients at Keetmanshoop ART clinic.
2. To describe changes in CD4 counts and body weight of clients on HAART over a 12 month period.
3. To investigate factors associated with adherence to HAART.
4. To analyse associations between CD4 count and adherence.
5. To analyse associations between changes in body weight and adherence.

CHAPTER 4

RESEARCH DESIGN AND METHODOLOGY

4.1 STUDY DESIGN

A descriptive cross-sectional survey was done. The researcher chose a cross-sectional study design as this type of design has a short time frame and therefore lower cost implications (Beaglehole, Bonita & Kjellstrom, 2000).There is also no risk of loss to follow-up of study participants since data is collected at one point (Beaglehole *et al*, 2000).

4.2 STUDY POPULATION

By end of December 2007, there were 675 adult clients registered on HAART at the Keetmanshoop ART clinic. The eligibility criteria for the study population was being 18 years and older, and on HAART for at least one year.

4.3 SAMPLING

From the study population of 675 clients, assuming an expected optimal adherence rate of 95% and a worst acceptable rate of 90% (i.e. 5% margin of error), at 99% level of confidence, a sample of 106 clients was calculated using Epi-Info's StatCalc statistical program. All clients attending the clinic who met the inclusion criteria were recruited into the study sequentially until the sample size was met.

4.4 PILOT STUDY

A pilot study was done on 10 clients at the clinic to pre-test the questionnaire. The pre-test served to assess the quality of the questionnaire, and the understanding of the questions. During the pre-test running of the interviews, it was realised that clients who were already

well-established on treatment did not bring their pills for the pill count. Also only at the pharmacy would they be able to establish if the pill count was corresponding to amount expected. Pill counts were therefore abandoned as a measure of adherence in this study, and only adherence to appointments was used. The question items asking about the partner status and whether they are on HAART were removed from the initial questionnaire because some of the clients in the pilot study were not comfortable with these questions.

4.5 DATA COLLECTION

Data collection started on the 9th of March, 2009 and ended on the 16th of April, 2009. A questionnaire was administered to clients attending the clinic who met the inclusion criteria. The questionnaire collected demographic data and data on source of referral to ART clinic, reminder tools, knowledge about HIV treatment, knowledge about consequences of poor adherence, disclosure levels and alcohol use. The client's file was then reviewed by the researcher to collect data on baseline, 6 month and 12 month CD4 cell counts and body weight (Appendix 1).

4.6 DATA MANAGEMENT AND ANALYSIS

The questionnaires were checked for completeness by the researcher and the data was captured in Microsoft access 2000. The data was then imported into the program EpiInfo version 3.3 for analysis. The frequencies of the demographic characteristics, source of referral to ART clinic, reminder tools, knowledge about HIV treatment, knowledge about consequences of poor adherence and disclosure levels were analysed using EpiInfo version 3.3. Graphs were drawn using Microsoft Office Excel 2007 while the tables drawn manually. Summary statistics of the continuous variables of age, CD4 counts and body weight were done using EpiInfo version 3.3 to calculate the median and interquartile range. Bivariate

analysis using two by two tables and calculation of chi-square was done to analyse correlations between adherence and the variables of sex, alcohol use, distance from clinic, disclosure to family members and disclosure to friends.

4.7 VALIDITY

4.7.1 SELECTION BIAS

The research was recruiting clients who were attending the ART clinic to participate in the study. This group of clients who keep their appointments may have better adherence levels than those likely to miss their appointments. The study also missed those who may have been lost to follow-up. By only recruiting those clients attending the clinic, the study may have selected clients who have good levels of adherence and missed those with poor adherence and lost to follow-up.

4.7.2 MEASUREMENT BIAS

The clients covered in the study had started their antiretroviral treatment between October, 2003 and March, 2008. There were some shortcomings in the record-keeping in the period 2003-2006 and some records did not have the 6 and 12 month CD4 and body weight values. The values missing were few and did not adversely affect the total quality of the CD4 and body weight data. The questionnaire was in English language. The interviewers were trained prior to data collection and were able to understand the questions adequately. The interviewers then translated and asked the questions in the local languages and this had a potential for measurement bias.

4.7.3 CONFOUNDING

Adherence to any long-term treatment is often influenced by various factors in a person's life (Kagee, 2004). These could be social, medical or psychological factors. Some of the known confounding factors could be depression and other undiagnosed psychiatric illnesses, substance abuse, and the degree of support a client has from family, friends or support groups.

4.7.4 RELIABILITY

A post-test of the data collection tool was not done for this study due to time and cost constraints. Reliability could therefore not be assessed for this study.

4.7.5 GENERALISABILITY

The sample in this study was clients who access antiretroviral therapy through the public health sector in Keetmanshoop. It can probably be generalised to other clients in Namibia accessing antiretroviral therapy in the public health sector in other districts with similar characteristics to Keetmanshoop.

4.8 ETHICAL CONSIDERATIONS

Ethics in research is based on the principles of respect of persons, beneficence, non-maleficence and justice for all persons (Bankowski, Bryant & Last, 1991). A research proposal should be submitted to an ethics body to ensure that the research conforms to acceptable scientific and ethical standards (Bankowski *et al*, 1991). In this study, ethical clearance to conduct the research was granted by the Ethics Committee of The University of

the Western Cape. Permission to conduct research was also granted by the Ministry of Health and Social Services, Namibia.

Persons being requested to participate in a research should have full information on the research and its implications to them and their communities to enable them make an informed decision on participation in research (Bankowski *et al*, 1991). The purpose and nature of this research was explained to all participants by the interviewers. Each client was given a participant information sheet which provided further information on the research and the right of the participants to decline to answer any questions or to withdraw from the research at any time. The participant information sheet also guaranteed participant confidentiality. Each participant who volunteered for the study signed a consent form. The questionnaires did not bear any names and there was no linkage between the questionnaire and the consent form. The identity of the study participants was therefore protected and kept confidential. The participants were assured that the information gathered was to be used for research purposes only for the mini-thesis.

CHAPTER 5

RESULTS

5.1 SAMPLE SIZE AND RESPONSE RATE

A sample of 106 was realised for the study. Response rate was 100% as all clients approached to participate in the study agreed to participate. However during data cleaning 4 of the questionnaires were found not to meet the study criteria and were therefore not used in the analysis. Three clients had been on treatment for less than 1 year and one client was 17 years old. One other questionnaire was also not used for analysis because this was a client who was attending the clinic for the first time as a transfer-in from another facility. He did not bring his transfer letter along and there was therefore no clinical record for him. The other 101 questionnaires were used for analysis.

5.2 DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS.

More women (63.4%) than men (36.6%) participated in the study (Figure 1). The respondents ranged from 18 years to 63 years with a median age of 40 years (Interquartile range [IQR] 34-46 years).

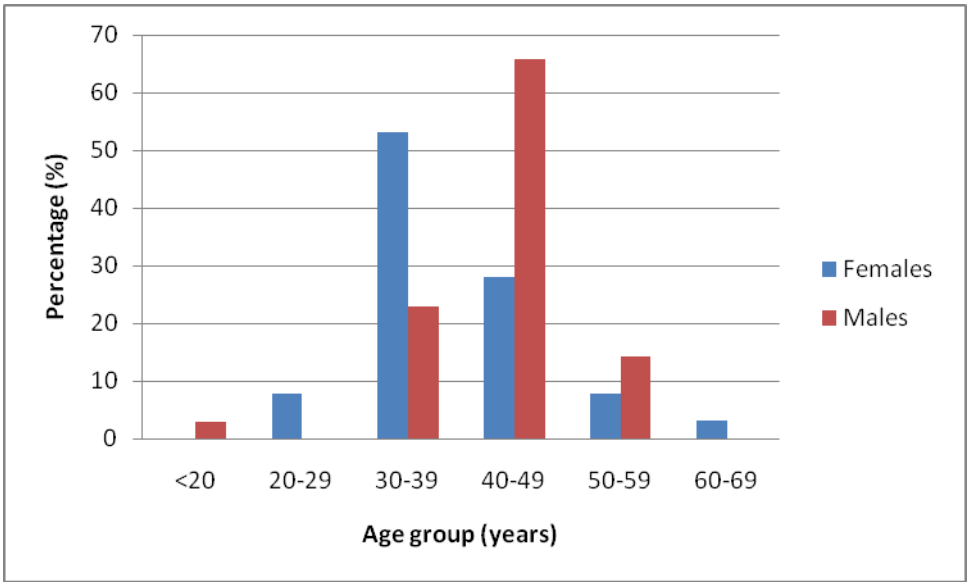


Figure 1. Age distribution of respondents by gender

Slightly less than two thirds (63%) of respondents were single and about a quarter were married (23%) (Table 1). Two respondents were divorced and a small proportion of respondents was co-habiting (6%) and widowed (5%).

Most (87%) of the respondents had either primary school education (47%) or secondary school education (40%). A small proportion (13%) had no schooling and none had tertiary education. Unemployment was high (53%), with only a third (33%) being permanently employed. A small proportion (13%) had seasonal employment and one respondent was self-employed. Most (72.8%) of the respondents lived within a radius of 10km of Keetmanshoop town. About a third (30%) of the respondents were members of a support group.

Table 1. Demographic characteristics of respondents

Variable	Males (%)	Females (%)	Totals (%)
Educational level			
No schooling	6 (16.2)	7 (10.9)	13 (12.9)
Primary	19 (51.4)	28 (43.8)	47 (46.5)
Secondary	12 (32.4)	29 (45.3)	41 (40.6)
Marital status			
Single	22 (59.5)	42 (65.6)	64 (63.3)
Married	13 (35.1)	11 (17.2)	24 (23.7)
Divorced	1 (2.7)	1 (1.6)	2 (1.9)
Live-in partner	1 (2.7)	5 (7.8)	6 (5.9)
Widowed	0	5 (7.8)	5 (5)
Employment status			
Permanent	21 (56.8)	13 (20.3)	34 (33.7)
Seasonal	5 (13.5)	8 (12.5)	13 (12.9)
Self-employed	0	1 (1.6)	1 (0.99)
Un-employed	11 (29.7)	42 (65.6%)	53 (52.5)
Distance to clinic			
>10km	10 (27.0)	18 (28.1)	28 (27.7)
<10km	27 (73.0)	46 (71.9)	73 (72.3)
Member of support group	8 (21.6)	23 (35.9)	31 (30.0)

5.3 SOURCE OF REFERRAL TO THE ART CLINIC

The public health system was the main source of referral of respondents to the ART clinic, accounting for 67.3% of referrals (Figure 2). The respective departments that referred to the ART clinic were the Tuberculosis Control Programme (26.7%), the PMTCT programme (17.8%) and the hospital wards and peripheral clinics (22.8%). About a quarter (26.7%) of the respondents was self-referred and a small percentage (5.9%) was referred from a local non-governmental organisation (the New Start Centre).

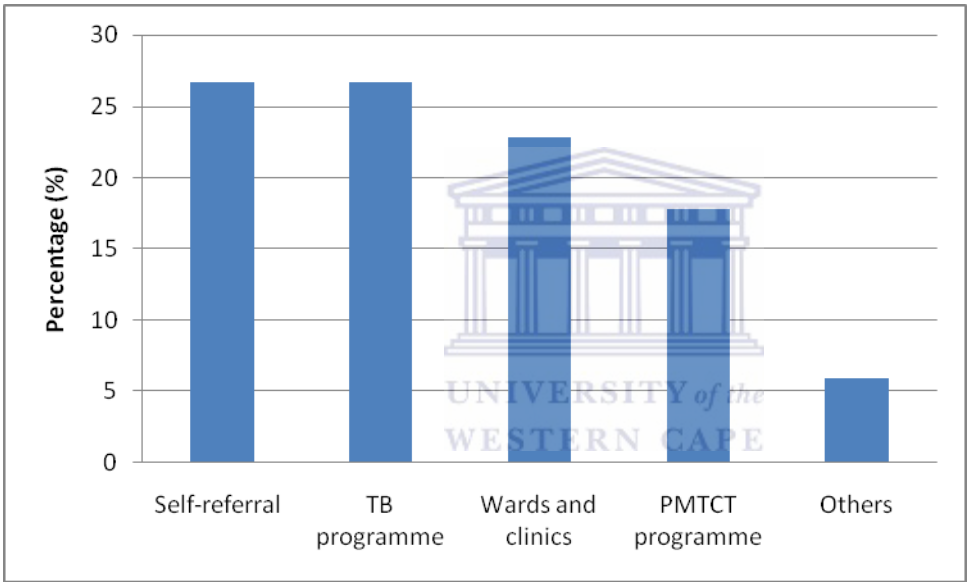


Figure 2. Source of referral of clients to the ART clinic

5.4 SOURCE OF LINKAGE TO SUPPORT GROUPS

Most respondents had been linked to support groups from the family (54.4%). Other sources of linkage to support groups were the church (21.1%) and health workers (17.5%).

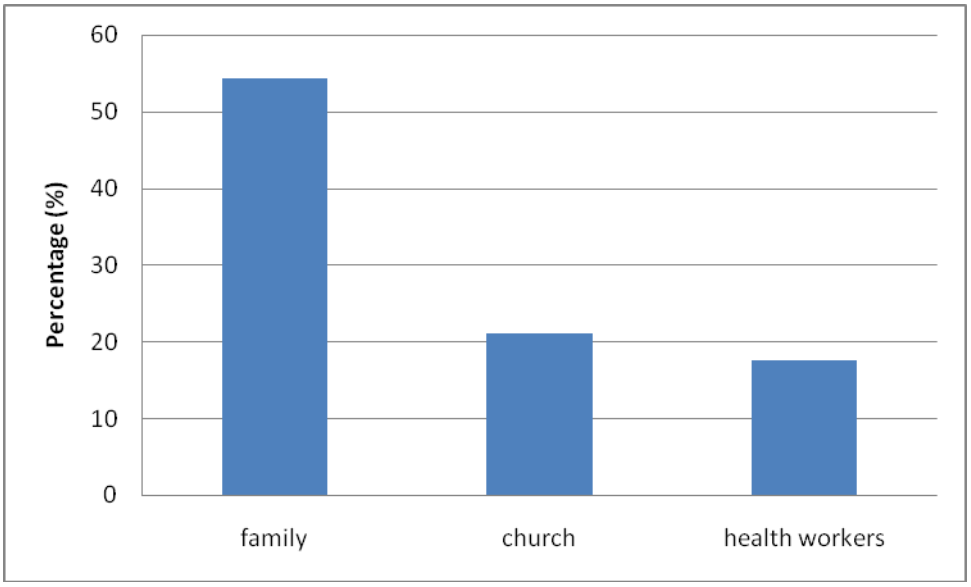


Figure 3. Source of linkage to support groups

5.5 INFORMATION AND KNOWLEDGE ABOUT HIV AND HIV TREATMENT

5.5.1 SOURCE OF INFORMATION

The main source of information about HIV and HIV treatment were health workers (73.3%) followed by the media (20.7%), family and friends (16.8%) and from the church (5%) (Figure 4). Some respondents reported more than one source of information.

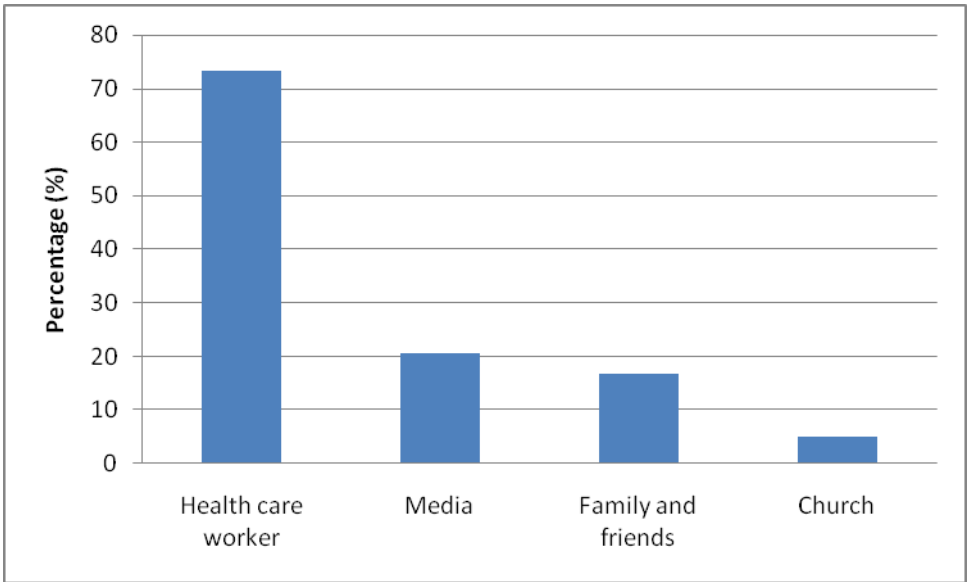


Figure 4. Source of information about HIV and HIV treatment

5.5.2 KNOWLEDGE ABOUT HIV TREATMENT

Most respondents were aware that HIV treatment reduces the amount of the HI virus (67.3%) and makes the body strong (59.4%) (Figure 5). Only one respondent said the treatment kills HIV, one responded that it cures HIV and one did not know how the treatment worked.

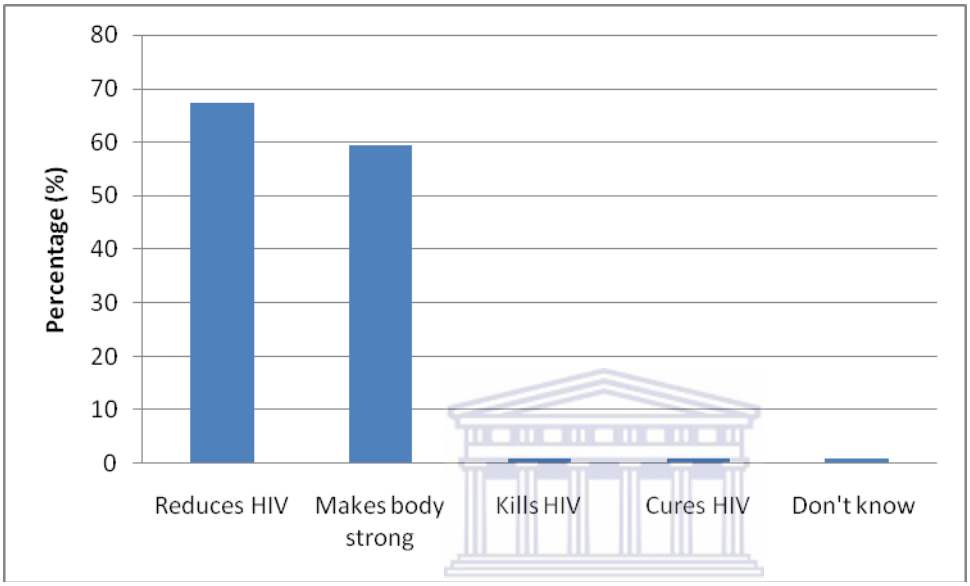


Figure 5. Knowledge about HIV treatment

5.5.3 KNOWLEDGE ABOUT CONSEQUENCES OF POOR ADHERENCE

Asked what would happen if one did not take treatment regularly, most respondents (62.4%) knew that one would get sick, while slightly less than half knew that the HIV infection would get worse (43.6%) and that one would become resistant to medicines (42.6%) (Figure 6). One responded that he would die.

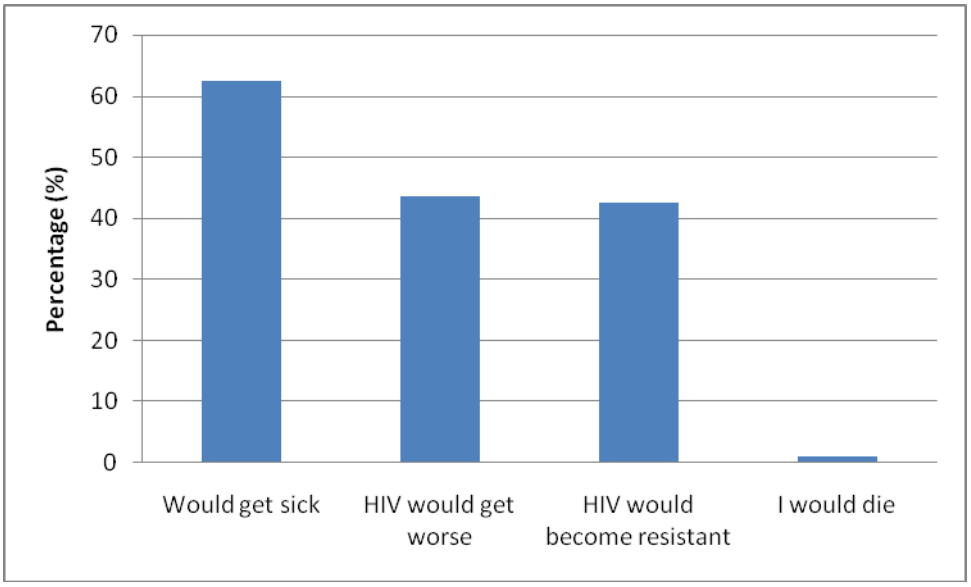


Figure 6. Knowledge about consequences of poor adherence

5.6 REMINDER TOOLS FOR HAART

The study participants were asked what resources they use to remember to take their treatment on time. Their responses included – alarm on watch, news on radio, a television programme, setting cellphone reminders, alarms on clock, and having family members remind them (Table 2). One participant took his treatment when reporting for his work shift. Three clients did not give any reminder tool. More than half (56.4%) of respondents had more than one reminder tool.

Table 2. Reminder tools

Reminder tool	Percentage of respondents
Watch/clock	59.4
Family member	36.6
Cellphone reminder	23.8
Radio programme	17.8
None	3
Work schedule	1

5.7 DISCLOSURE OF HIV STATUS

Most respondents (98%) had disclosed their HIV status to at least one person (Figure 7). Only two respondents had not disclosed their status to anybody. The respondents had higher levels of disclosure within the family than among the friends. Half of the respondents (50%) had disclosed their status to all the family members but only slightly less than a third (28%) had disclosed to all their friends.

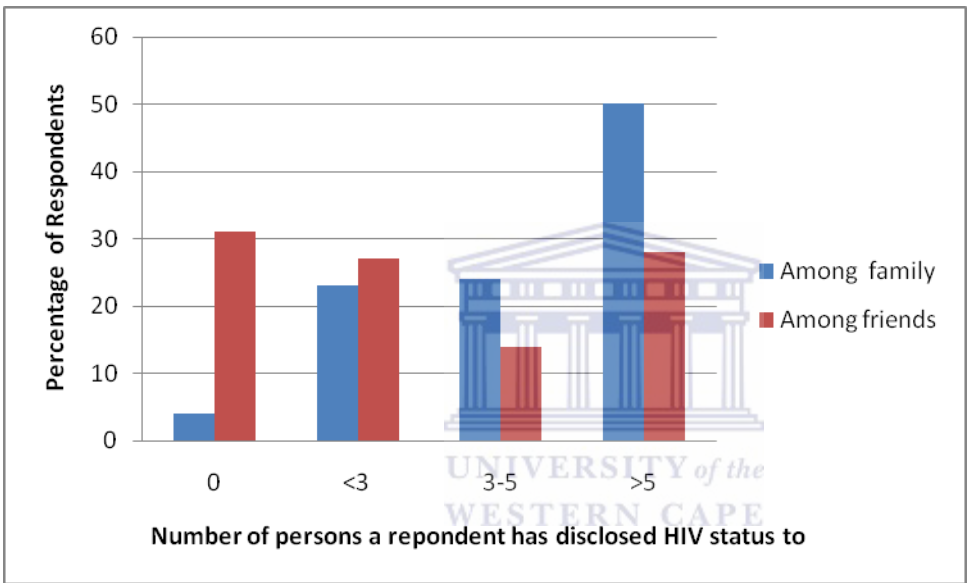


Figure 7. Level of disclosure of HIV status among family or friends

5.8 ADHERENCE

Adherence was measured as the percentage of the appointments kept in the year preceding the study. 100% adherence was defined as coming for all the appointments within one week of the appointment date. 90% adherence was defined as missing not more than two appointments in the year but coming for a follow-up within a fortnight of the missed appointment. Most (86.1%) study participants kept 90% or more of their appointments and were classified as having optimal adherence (Figure 8).

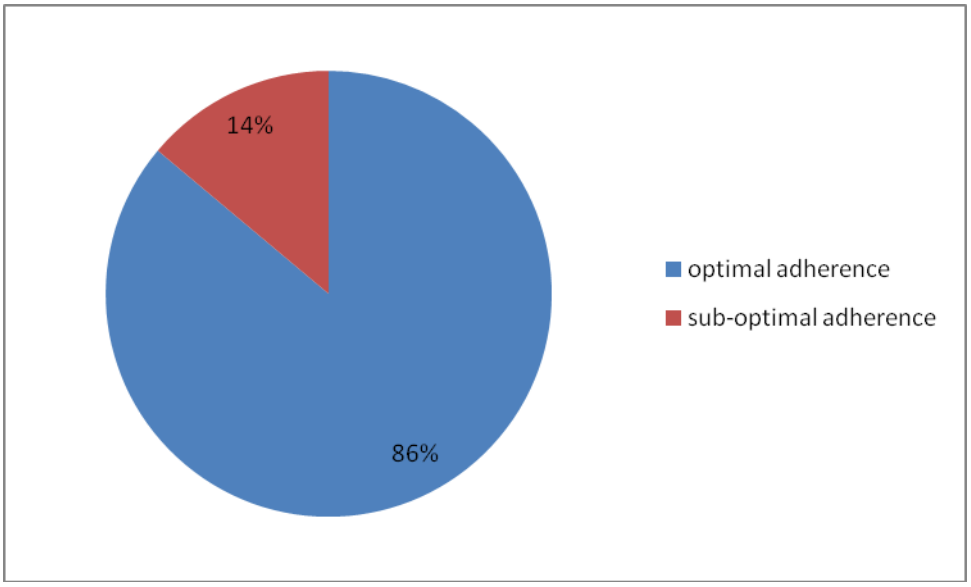


Figure 8. Adherence levels

5.9 CD4 CELL COUNTS AND BODY WEIGHT OF RESPONDENTS

The median CD4 cell count of the study participants at the start of treatment was 126 cells/µl (Interquartile range [IQR] 79-178) (Figure 9). The median CD4 cell count increased to 279 cells/µl (IQR 161-414) at 6 months and 304 cells/µl (IQR 220-464) at 12 months. The median CD4 cell count of the most recent result available for the respondents was 366 cells/µl (IQR 257-465).

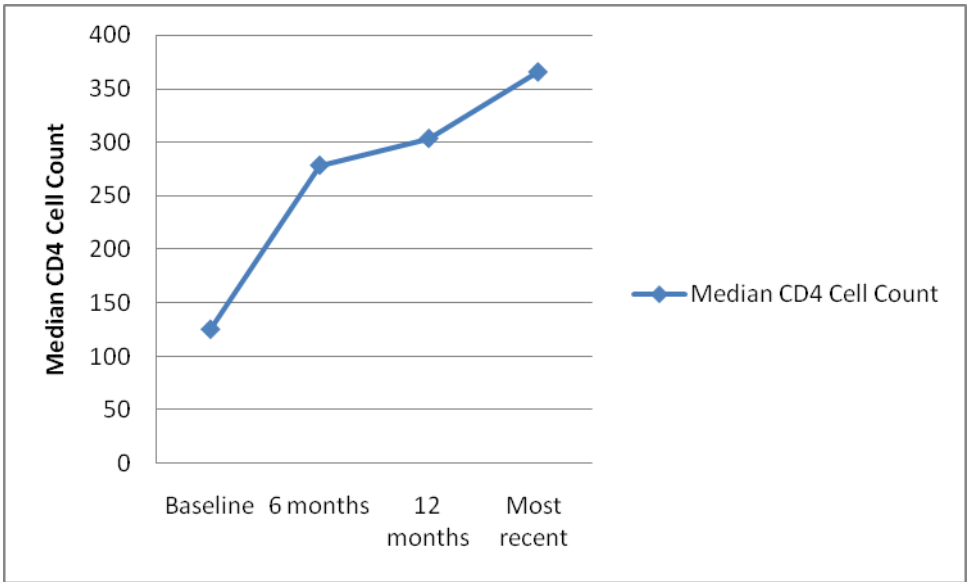


Figure 9. Median CD4 cell counts

The median body weight of study participants at start of treatment was 50 kg (IQR 44-60). This increased to 56kg (IQR 48-66) at 6 months (IQR 50-67) and 57kg at 12 months (Figure 10). The median body weight of the respondents at the time of the study was 58kg (IQR 50-67).

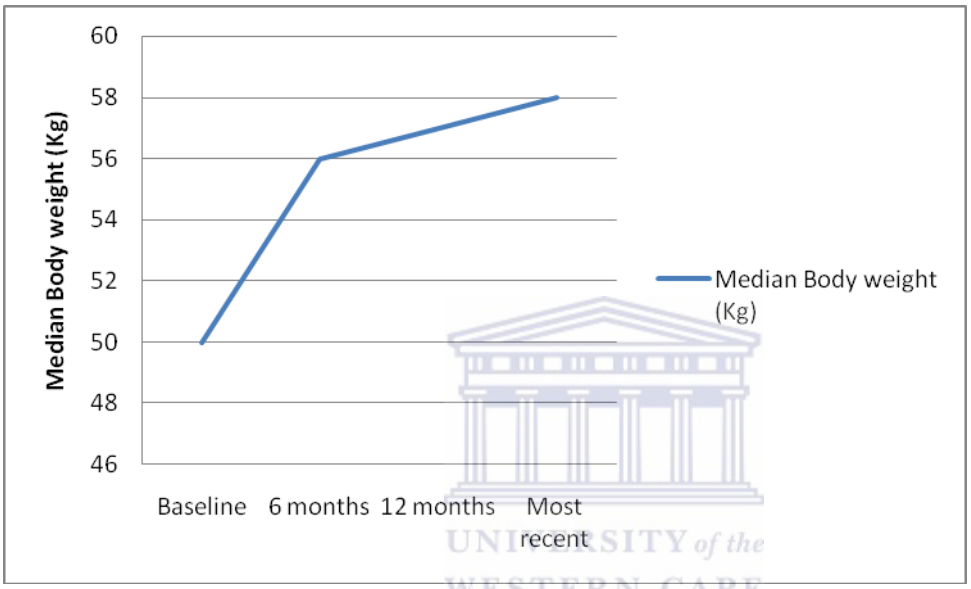


Figure 10. Median body weight of study participants

5.10 CD4 CELL COUNTS AND ADHERENCE

The median CD4 cell counts were stratified for adherence level to determine if there was any association between CD4 cell counts and adherence (Figure 11). Respondents who had optimal adherence over the past year showed steady increases in CD4 cell counts while respondents who had sub-optimal adherence showed inconsistent increases in the CD4 cell counts.

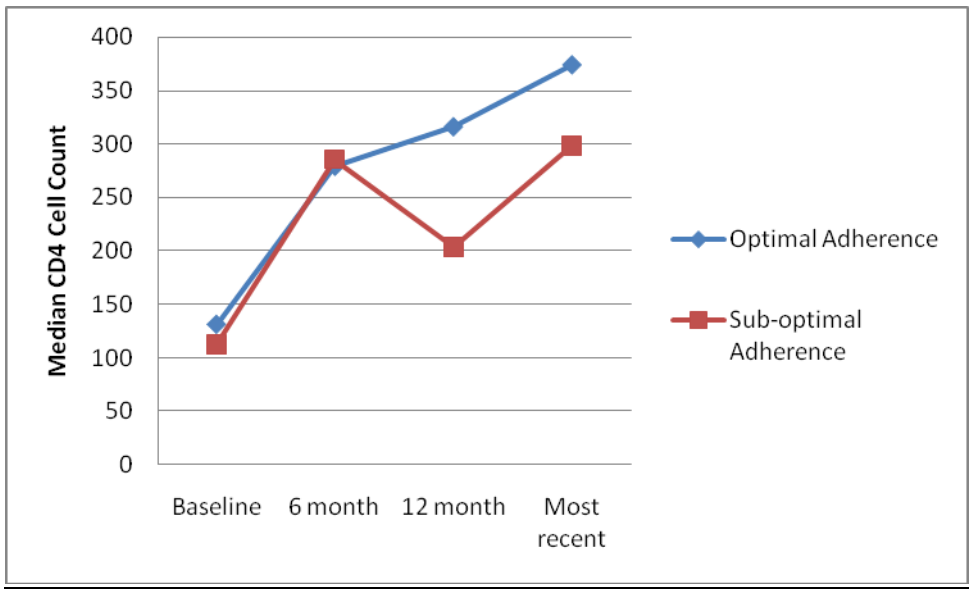


Figure 11. Median CD4 cell counts by adherence

5.11 BODY WEIGHT AND ADHERENCE

The median body weight was also stratified for adherence level to determine if there was any association between body weight and adherence (Figure 12). Respondents who had optimal adherence over the past year showed a steady increase in body weight while respondents who had sub-optimal adherence showed inconsistent body weight gain.

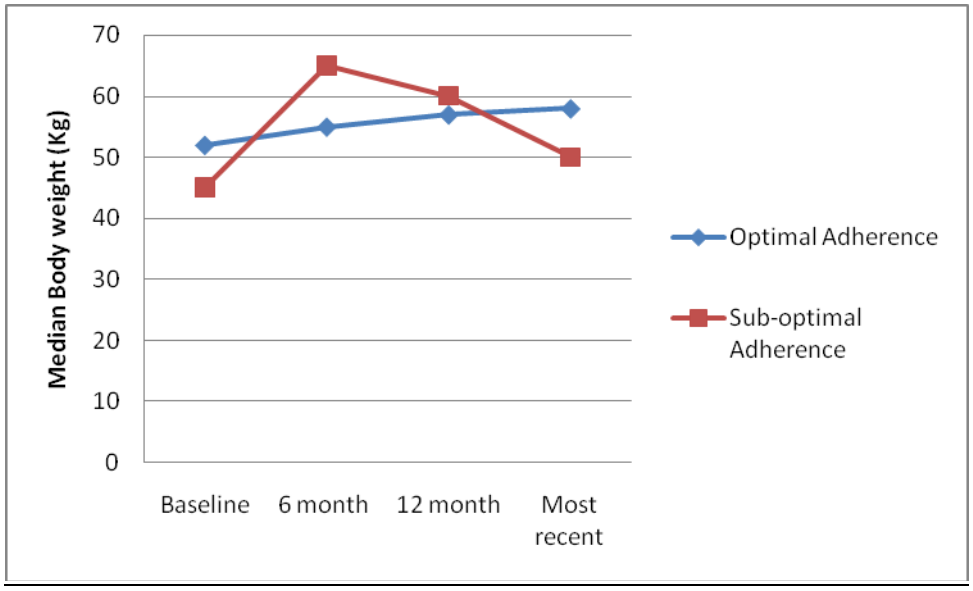


Figure 12. Median body weight by adherence

5.12 FACTORS ASSOCIATED WITH ADHERENCE TO HAART

The variables sex, alcohol use, distance from clinic, disclosure to more than 5 family members and disclosure to more than 5 friends were tested for associations with adherence using the Chi-square test (Table 3). Only distance from clinic was found to be statistically associated with adherence. Participants who lived more than 10 kilometres away from the clinic were 1.47 (95% C.I. 1.11-1.95) times more likely to have sub-optimal adherence.

Table 3. Factors associated with suboptimal adherence

Variable	Risk Ratio (95% C.I.)	Chi-square	P value
Sex=female	1.04 (0.88-1.16)	0.27	0.40
Uses Alcohol	0.96 (0.77-1.2)	0.14	0.47
Lives >10km from clinic	1.47 (1.11-1.95)	15.3	0.00
Disclosed to more than 5 family members	0.99 (0.85-1.16)	0.00	0.59
Disclosed to more than 5 friends	0.94 (0.78-1.14	0.38	0.36

CHAPTER 6

DISCUSSION

6.1 DEMOGRAPHIC CHARACTERISTICS

The response rate of this study was very good as all the clients who were approached for the study agreed to take part. In this study there were more women than men in a ratio of about 2:1. This is also reflected in the Namibian national enrolment for HAART where women have a ratio of about 2:1 to men (MOHSS, 2007). It is also the case in other studies in Africa where there are more women enrolled in HIV treatment in the public sector than men, for example in a study in Uganda study there were 37% of men compared to 63% of women (Nakiyemba *et al*, 2004). A South African study in Khayelitsha had a female enrolment of 70% while a Mozambique study had a female enrolment of 55% (Coetzee *et al*, 2004; Marazzi *et al*, 2006). At two public health facilities offering HAART in Gauteng, South Africa the female enrolment was 73.5% (Kigozi, 2008).

This higher female enrolment in public ART programmes could be explained by the fact women are more likely to interact with the health services more often than men as they attend antenatal services and family planning services (Kigozi, 2008). This increases their opportunity to access HIV care. In this study 17.8% of respondents were referred from the PMTCT services, all women. Another reason for lower male enrolment in the public sector ART services could be that employment levels are higher in men and they could be accessing HAART through work-based programmes.

The age distribution of the study participants peaked at 30-39 years in females and 40-49 years in males. This has also been found to be the age group with the highest prevalence of

HIV. During the Namibian 2008 National Testing Day the HIV prevalence was highest in the 30-44 age groups (MOHSS, 2008b).

Most of participants had primary and secondary education. There were no participants with tertiary education in this study. Enrolment in tertiary education is low in the Karas region as seen in the 2006-2007 NDHS. In that survey there were only 4.4 and 4.1% women and men with tertiary education respectively in the Karas region (MOHSS, 2008a). The unemployment rate in this study was 65.6% for women and 29.7% for men. This was also seen in the 2006-2007 NDHS where women had a higher unemployment rate of 41.1% in Karas region at the time of the survey compared to 25.1% for men (MOHSS, 2008a).

About a quarter of the study participants had been referred for HAART from the tuberculosis (TB) programme. This underscores the importance of TB as a major opportunistic infection in HIV- infected individuals, especially in areas with a high TB burden. Self-referral to the ART clinic in this study was 26.7 %. A further 5.9% of participants had come from a local NGO which offers VCT. This translates into 32.6% of participants who initiated HIV testing through VCT and were able to start antiretroviral therapy. Knowing one's HIV status is an important first step in the control of HIV. For those who test negative, the prevention message is reinforced and they can be motivated to remain negative. For those who test positive it will be an entry point into comprehensive care and they will also be counselled on risk reduction to avoid re-infection. VCT has been found to be efficacious in reducing HIV transmission. In a randomised controlled study in three countries, Kenya, Tanzania and Trinidad and Tobago, individuals and couples who received VCT interventions had significant reductions of unprotected sex at the first follow up compared to the group that received health education only (Center for AIDS Prevention Studies, 2000).

6.2 ADHERENCE AND FACTORS ASSOCIATED WITH ADHERENCE

Adherence to HAART in this study was fair with 86.1% of participants showing optimal adherence. However, a sub-optimal adherence rate in the study was 13.9% and this is higher than the acceptable level of <5%.is not acceptable and the ART programme needs to address this. This level of optimal adherence is comparable with studies in other parts of Africa. In the Senegalese study 88% of clients had good adherence levels while three studies in South Africa have found 88%, 93.5% and 89% of clients having optimal adherence levels respectively (Nachega et al, 2004; Orrell et al, 2003; Kigozi, 2008). In the meta-analysis of studies on adherence by Mills (2006) and others, African studies showed adherence levels of 77%.

These fair levels of adherence in Keetmanshoop could be explained by various factors that could be impacting on adherence. Alcohol use and substance abuse has been shown in other studies to affect adherence (Stone, 2002). Though alcohol abuse is a major problem in the district, alcohol use among the study participants was found to be very low and did not impact on adherence. Knowledge about HIV and HIV treatment was also high among the study participants. The study participants also had good knowledge about the consequences of poor adherence. The health system is still the main source of information about HIV and HIV treatment. Other sources of information included the media, family members and the church. Educational interventions that improve knowledge have been shown to impact positively on adherence, as seen in the study by Goujard (2003) and others. In a study in Uganda, the radio was one of the main sources of information on HIV/AIDS (Nakiyemba *et al*, 2004). A radio health education program was started in Keetmanshoop district in 2007

(Keetmanshoop DCC, 2008). This programme gives information about HIV/AIDS among other health issues.

About thirty seven percent (37%) of the respondents had family members remind them about taking their treatment. Apart from family members reminding them, study participants also used watches (59%), radios (37%) and cell phones (24%) as reminder tools. Most respondents (56.4%) relied on more than one reminder mechanism. This strategy of pegging of treatment to daily routines like listening to news or reporting for work has been seen in other studies like in Tanzania or in Belgium among care givers for children on HAART (Watt *et al*, 2008; Hammami *et al*, 2004). Routinizing of pill-taking is one of the strategies that impact positively on adherence.

The use of family and social support in this study compares well with other studies in Africa which have shown that family and social support plays an important role in PLWHA adhering to their antiretroviral treatment. In the Uganda study clients reported that family members helped with support for adherence (Nakiyemba *et al*, 2004). The study by Ware and others (2009) showed social capital playing a major role in patients' adherence to HAART. In Tanzania material and emotional support from others was one of the factors that facilitated adherence. Using more than one reminder tool may also have contributed to the good adherence levels in this study.

A quarter of the study participants had used cell phones as part of their reminder tools in this study. The use of cell phones has increased exponentially in Africa in the past ten years and it is estimated that about 60% of adults in Africa now own cell phones (Lehr, 2005). Cell phones are not only used as a means of communication but also as a source of information

and for facilitating trade in Africa's informal sector. Airtime has been used for barter trade and for transfer of currency (Lehr, 2005). In Namibia, the largest cellular network – Mobile Telecommunications Limited (MTC) recently celebrated one million customers. In a country with a total population of about 2 million, this translates into a very high coverage. The use of cell phones and cellphone tracking technology as a drug-tracking, patient monitoring and reminder tool for HAART is an avenue that is already being explored (Microsoft research, 2009).

Thirty percent (30%) of the participants were also members of community support groups. Knowledge of support groups in the area was low at 46.5%. Of those participants who knew about support groups, most had learned about the groups from family (54.4%) and the church (21.1%). Only 17.5% of participants had learned about support groups from the health workers. This low level of knowledge of local support groups had also been seen in Kenya, where at the start of a HAART-DOT program, researchers found that almost two thirds of people had not heard of the local support groups (Sarna, Hawken & Kaai, 2004). A study in Gauteng, South Africa, also found very low levels of membership of support groups (Kigozi, 2008). Fear of the community members knowing one's HIV status and risking stigma or discrimination may influence people's willingness to join support groups.

6.3 CD4 CELL COUNT AND BODY WEIGHT CHANGES

The median CD4 cell count at start of therapy in this study was 126 cells/µl
. In Namibia the criteria for starting HAART in adults is a CD4 cell count of 200 or below or WHO stage 3 or 4 disease (MOHSS, 2007). Most people therefore start antiretroviral therapy with advanced HIV disease and a negative body weight balance. The respondents experienced significant weight gain in the first six months. The median body weight increased by 6kg after 6 months of treatment. However the body weight gain levels off as

respondents reach their expected body weight. In respondents with optimal adherence the body weight gain was maintained but the respondents with poor adherence were not able to maintain their body weight gain and experienced weight loss by 12 months.

The immunological response of the study participants was good as seen in the increase in the median CD4 cell counts. Participants in this study showed improvements in their indices with the median CD4 cell count doubling by 6 months and increasing to 304 cells/µl by 12 months from a baseline of 126 cells/µl. The initial CD4 cell count recovery was good in all the respondents up to 6 months. However responds with sub-optimal adherence were not able to maintain the CD4 increases and experienced a decrease of CD4 cell counts by 12 months. Respondents with optimal adherence had a sustained increase in their CD4 cell counts.

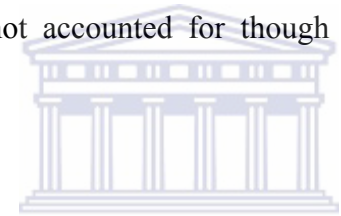
Patients in other African settings have also started HAART with advanced disease and shown good immunological responses to therapy. Most patients in treatment programmes in Africa start therapy with CD4 cell counts of less than 200 cells/µl. Patients in Senegal had a median increase of 180 cells/µl by 18 months (Laurent *et al*, 2002). In South Africa, the Soweto study saw an increase of CD4 cell counts from 200 cells/µl at baseline to 324 cells/µl while the Khayelitsha study had an increase of 288 cells/µl by 18 months from a baseline of 43 cells/µl (Nachega *et al*, 2004; Coetzee *et al*, 2004).

6.4 STUDY LIMITATIONS

Measurement of adherence to medication by adherence to appointments is an imprecise measure and the measured level of adherence may be a crude estimate of the real adherence level. The study also assessed the CD4 cell counts and body weight of the participants. CD4 cell counts are acceptable surrogate markers for viral loads but changes in body weight have

been shown to correlate poorly with viral loads or CD4 cell count changes. In this study information on adherence and other study variables was collected at the same time, therefore temporal association between adherence and other variables could not be fully described. This limited the study in making causal inference about adherence.

This study was also limited in that it only covered clients who are attending the clinic. By focusing only on clients attending the clinic, the study misses out on an important group of clients who may be poor adherers and not attending clinic regularly, or who may have defaulted therapy. This could result in an artificially high level of adherence. The study period was also limited as data was collected over a one month period. Seasonal variations of attendance at the clinic were not accounted for though this could have an influence on findings.



CHAPTER 7

CONCLUSION AND RECCOMENDATIONS

This study set out to determine adherence levels at Keetmanshoop and factors that could influence adherence. The study found that most clients at Keetmanshoop ART clinic were aware about the risks associated with poor adherence. The study also found that clients on HAART use several strategies to help them remember to take their medicines. This could partly explain the good adherence levels among the respondents. The study found that of those clients who are attending the clinic, adherence levels were good with 86.1% of respondents having optimal adherence.

The study also demonstrated that the clients on HAART experienced immunological and clinical recovery with increases in the CD4 cell count and body weight gain. The study found that adherence levels have an impact on CD4 cell count and body weight. Sub-optimal adherence was associated with falling CD4 cell counts and weight loss. This correlation between adherence levels and CD4 cell count demonstrates that in settings where viral load testing cannot be done, CD4 cell counts could be used as a measure of adherence.

The study found that distance from the clinic to be the only factor significantly associated with adherence. The Keetmanshoop ART programme will need to address the issue of adherence in patients who live far from the clinic. This can be done by incorporating ART services in the Primary Health Care (PHC) services and providing these services at the PHC clinics in the district. The ART services should also be incorporated in the district outreach services to further improve access to the services.

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Appendix 1

Q.no. _____

Record Review

	Baseline	6 months	12 months	Latest
CD4 cell count				
Weight				

Percentage of appointments kept in last one year: _____

Questionnaire

How old are you: _____

Sex: _____

Marital status:

Married

Single

Separated/divorced

Widowed

Steady live-in partner

Employment status:

Unemployed

Self-employed/own business

Permanently employed

Seasonal employment

Educational level:

No schooling

Primary level

Secondary level

Tertiary level

Where do you live? _____

With whom do you live?

With husband/wife

With partner

With family

With friends

Alone

How many people live in the house? _____

Do you take alcohol? _____

Do you smoke? _____

When did you know you had HIV? _____

When did you start the HIV treatment? _____

How did you get to know about HIV and the treatment for HIV - HAART?

From health workers

From family

From friends

From the media

From the church

Other

How were you enrolled in this clinic?

From the ANC

From the TB programme

From NewStart/other NGO

From the wards/by health worker

Self – referral

At what time do you take your treatment? _____

For how long will you take the treatment?

_____

_____

What helps you most to remember to take treatment?

_____

_____

Are there times when sometimes you miss a dose or forget to take a dose, or do not fell like taking the medication? _____

During the last one month, how often did you happen to miss your treatment?

_____

If you miss your treatment, what do you do?

_____

What is most challenging in taking the treatment?

_____

How has being on treatment influenced your life?

_____

How does the treatment work?

It cures HIV

It kills the HIV

It reduces the HIV

It makes my body strong

Don't know

Other (please specify) _____

What would happen to you or the HIV virus if you did not take the medicines regularly?

Nothing

I would get sick

The HIV would get worse

The HIV would become resistant to the medicines

I would get better

Don't know

Other (please specify) _____

How has being on treatment affected your daily life or family?

_____

_____

Have you ever received any counselling about HIV or the HIV treatment?

_____

How often have you received counselling?

_____

What have you learned from the counselling and how has it helped you?

_____

_____

Who supports you most about taking your medicines?

_____

What sort of support does he/she give you?

_____

_____

Do you know of any support groups in your area? _____

Which ones? _____

_____

_____

How did you get to know about the support groups?

From the health worker

From family member or friend

From the media (radio, TV, newspapers)

From the church

Other (please specify) _____

Are you a member of a support group? _____

If yes, what activities or support does the group give?

_____

_____

If not, why not?

Do not know of any support group

Do not know how to join one

Don't want to be identified with a HIV-related group

Just don't want to join any

Other (please specify) _____

What further support do you think you would need? _____

_____

_____

How have you benefited from being on treatment?

No benefit

I'm cured of HIV

I don't get sick often

I have gained weight

I have gone back to work

Now that you are on treatment, do find easier or difficult to talk about HIV?

_____

_____

In your family, how many people have you told your HIV status?

_____

Among your friends and workmates, how many people have you told your HIV status?

_____

What are the challenges you have faced since knowing your positive HIV status?

_____

_____

How do you think the availability of treatment has influenced people's attitude towards HIV?

_____

_____

What challenges do you face in coming to the clinic for your treatment?

_____

_____

How do you find the service offered at the clinic?

_____

_____

Does the service at the clinic affect your motivation for the treatment?

_____

_____

What would you like to see changed or improved in the clinic services?

_____

_____

What message do you have for the clinic staff, the government or the Namibian people?

_____

_____

Thank you very much for your time.

God bless you and keep on adhering to you HAART medications.

Appendix 2

UNIVERSITY OF THE WESTERN CAPE

School of Public Health

Private Bag X17 ● **BELLVILLE** ● 7535 ● South Africa

Tel: 021- 959 2809, Fax: 021- 959 2872

PARTICIPANT INFORMATION SHEET

Request for your participation in a research

I am Wambui Njuguna, a student at the School Of Public Health (SOPH), University of Western Cape (UWC). I would like to request for your participation in a research I am conducting. The research is for a Mini-Thesis – which is part of the requirement for a Masters degree in Public Health (MPH).

Following is information about the research.

Title of research

Adherence to HAART among patients in the Keetmanshoop ART Programme in Namibia

Description of the research

The research seeks to find out about adherence to HIV treatment and what factors are influencing adherence here in Keetmanshoop. The research has been approved by the University of Western Cape and the Ministry of Health and Social Services, Namibia. The study will include a review of your clinical record and an interview with you through a questionnaire. I will collect information from your clinical records. I will also ask you questions about your HIV treatment and how you are coping with the treatment. All this information will only be used for this research.

Participation

Your participation in the research is voluntary, i.e. of your own free will. You are also free to withdraw from the research at any time should you wish to do so. If there is any detail or question that is not clear, please ask so that I can clarify further. If there is a question you do not feel comfortable answering, you do not have to answer it.

There is no expected benefit or harm to you from the research. It is hoped that the research will impact positively on the services you and others receive from this program.

Anonymity and Confidentiality

Your identity will be kept anonymous. Your name will not appear on the questionnaire and the information you provide will not be linked back to you in any way. The consent form that you sign will be kept separately from the questionnaires. All the documents pertaining to the study will be kept safely until completion the study. Once data analysis is done and the study report written, the documents will be destroyed.

Uses of the research

The research will be used for a mini-thesis, to obtain a Masters degree in Public Health at the University of the Western Cape.

A report of the research will also be made available to the Ministry of Health and Social Services, Namibia, through the Keetmanshoop Health District Coordinating Committee.

Informed Consent

If you decide to take part in the research, I will ask you to sign the attached consent form as prove that you have agreed to participate in the research.

Contact details

Thank you for agreeing to take part in the research.

I am accountable to Dr Brian Van Wyk, my supervisor for the Mini-Thesis.

Should you have any further queries, feel free to contact me or my supervisor.

The contact details are:

Wambui Njuguna
Student number: 2655201
Tel: 264813643829
Email: njuguwa@yahoo.com

Dr Brian Van Wyk
School of Public Health
University of Western Cape
Tel: 27219592173
Email: bvanwyk@uwc.ac.za

Appendix 3

UNIVERSITY OF THE WESTERN CAPE

SCHOOL OF PUBLIC HEALTH

Private Bag X17 ● **BELLVILLE** ● 7535 ● South Africa

Tel: 021- 959 2809, Fax: 021- 959 2872

RECORD OF INFORMED CONSENT TO CONDUCT AN INTERVIEW

Researcher: Wambui Njuguna
UWC Student number: 2655201
Tel: +264813643829
E-mail: njuguwa@yahoo.com
Place: Keetmanshoop state hospital

Interviewer Agreement

I agree to conduct a research on the participant whose signature appears below.

I undertake to keep the participant's identity and the contents of the research interview confidential. I will use the information gathered for the purposes of a mini-thesis. Any change from this agreement will be renegotiated with the participant.

Interviewee Agreement

I have read the participant information sheet / the contents of the participant information sheet have been explained to me.

I fully understand that I am taking part in a research and I am participating voluntarily. The research will be used for a Mini-Thesis and includes collecting information from my clinical records and information from me about my HIV treatment. I have been assured that this information will be confidential.

I hereby give consent to participate in the research.

Signed by Interviewee:

Signed by interviewer:

Date:

REPUBLIC OF NAMIBIA

Ministry of Health and Social Services

Private Bag 13198 | Ministerial Building | Tel: (061) 2032562
Windhoek | Harvey Street | Fax: (061) 272286
Namibia | Windhoek | E-mail:hilmanangombe@yahoo.com
Enquiries: Ms. H. Nangombe Ref.: *17/3/3/AP* | Date: 16 March 2009

OFFICE OF THE PERMANENT SECRETARY

Dr. Wambui Njuguna
P.O. Box 1875
KEETMANSHOOP

Dear Dr. Njuguna,

RE: ADHERENCE TO HIGHLY ACTIVE ANIT -RETROVIRAL TREATMENT AMONG PATIENTS IN THE KEETMANSHOOP ANTI-RETROVIRAL THERAPY PROGRAMME IN NAMIBIA.

1. Reference is made to your application to conduct the above-mentioned study.

2. The proposal has been evaluated and found to have merit.

3. Kindly be informed that approval has been granted under the following conditions:

   3.1 The data collected is only to be used for your academic purpose;
   3.2 A quarterly progress report is to be submitted to the Ministry's Research Unit;
   3.3 Preliminary findings are to be submitted to the Ministry before the final report;
   3.4 Final report to be submitted upon completion of the study;
   3.5 Separate permission to be sought from the Ministry for the publication of the findings.

Yours sincerely,

Mr. K. Kahuure
PERMANENT SECRETARY